# 2. THE PROPOSED ACTION AND ALTERNATIVES

This section discusses the proposed action, the no-action alternative, and alternatives dismissed from further consideration.

## 2.1 PROPOSED ACTION

The proposed action is for DOE to provide cost-shared funding for the design, construction, and demonstration of proposed facilities near Gilberton, Pennsylvania, to produce electricity, steam, and liquid fuels from coal waste by integrating coal gasification and Fischer-Tropsch (F-T) synthesis of liquid hydrocarbon fuels (Section 1.3). The proposed action described in the following sections is DOE's preferred alternative.

### 2.1.1 Project Location and Background

The site for the proposed project is located adjacent to the existing Gilberton Power Plant near the boroughs of Gilberton and Frackville, in Schuylkill County in eastern Pennsylvania (Figure 2.1.1 and Figure 2.1.2). The area is primarily rural with a mixture of industrial, commercial, and residential land use in the vicinity. The site is about 1 mile north of Interstate 81 and 2 miles east of State Highway 61. The city of Pottsville is located about 8 miles to the south of the site. The city of Reading lies 35 miles to the south-southeast, the city of Harrisburg is situated 50 miles to the southwest, and the city of Scranton is located slightly over 50 miles to the northeast. The main plant for the proposed project would occupy about 75 acres of nearly level land owned by WMPI PTY, LLC on top of Broad Mountain. The land is currently an undisturbed forested area.

WMPI's Gilberton Power Plant began operation in 1988 and employs about 150 people. The plant generates from two circulating fluidized bed boilers a total of approximately 80 MW (net) of electricity for the regional power grid and provides 800,000 lb of steam per hour to heat a nearby state prison and to dry coal. As a comparison, if all of the energy were used to generate electricity rather than also providing steam, the power plant would generate about 82 MW (net). The plant annually burns about 640,000 tons of anthracite coal waste (culm) for fuel. Culm consists of rock and coal with varying amounts of carbon material remaining after removal of higher-quality saleable coal. The principal structures of the existing plant, which occupy about 6 acres of the 20-acre cleared site, are the boiler building, turbine building, administration building, raw water treatment building, water storage tanks, circulating water pump house, mechanical-draft cooling towers, baghouses for particulate control, and solid waste silo. The plant provides electricity to the adjacent Hauto-Frackville #3 69kV transmission line. Coal mining and disposal of coal combustion byproducts occur on a portion of the 36,000 acres of WMPI land in the local area. Bottom ash and fly ash from the Gilberton Power Plant are either sold (e.g., for use as road aggregate) or used on WMPI land to restore the contours of land changed by strip mining. The closest railroad siding is about 1 mile away near the borough of Gilberton.

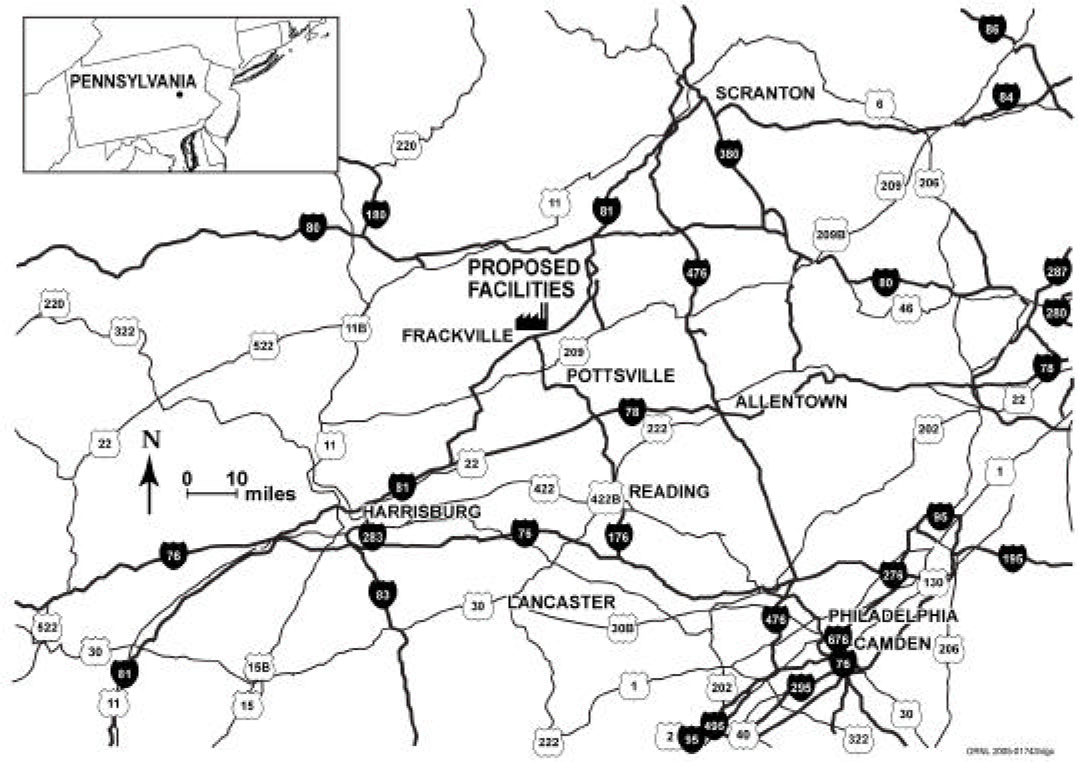


**Figure 2.1.1. General location of proposed facilities.**

## 2.1.2 Technology and Project Description

The proposed facilities would use coal waste to produce electricity, steam, and high-quality liquid fuels, including low-sulfur and low-nitrogen diesel fuel and naphtha, by integrating the coal gasification and F-T synthesis technologies. The primary feedstock would be low-cost anthracite culm, which is a locally abundant, previously discarded resource (about 100 million tons) that could accommodate fuel requirements throughout the approximate 26-year lifetime of the facilities. The proposed facilities would also be capable of using a blend of feedstock containing up to 25% petroleum coke, although no petroleum coke would be used during the demonstration period and its use during commercial operation following the demonstration period is uncertain. Petroleum coke is a high-sulfur, high-energy product having the appearance of coal. Oil refineries produce petroleum coke by heating and removing volatile organic compounds (VOCs) from the residue remaining after the refining process. Because of the uncertainty associated with the use of petroleum coke, further discussion regarding this feedstock is minimal. However, if petroleum coke were used, air emissions would remain within permitted levels for criteria pollutants and hazardous air pollutants (Section 4.1.2.2).

The facilities would produce about 5,000 barrels of liquid fuels per day and 41 MW of electricity for export to the regional power grid by tapping into the nearby, existing Hauto-Frackville #3 69kV transmission line. The net efficiency would be about 45%, compared to an efficiency of about 33%

for a traditional coal-fired power plant and about 40% for a state-of-the-art integrated gasification combined-cycle power plant, which uses synthesis gas derived from coal to drive a gas combustion turbine and exhaust gas from the gas turbine to generate steam from water to drive a steam turbine.

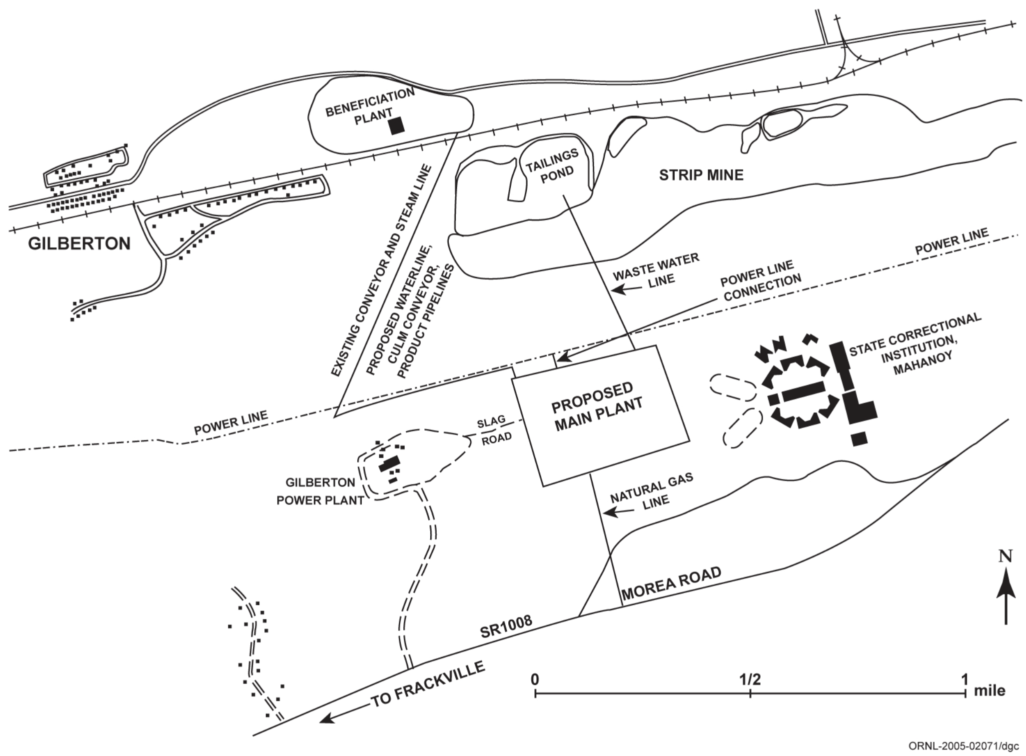


**Figure 2.1.2. Location of proposed main plant and ancillary facilities.**

Emissions from the facilities would be small (Section 2.1.6.1), especially for sulfur dioxide ($SO_2$), because most of the sulfur would be removed from the synthesis gas prior to conveying the gas to the F-T liquefaction facilities and to a combined-cycle power plant, which is part of the proposed project. The use of anthracite culm would reduce waste disposal from operating mines and allow reclamation of land currently stockpiled with culm.

The proposed project would provide the first demonstration of integrating the coal gasification and F-T technologies, both of which have been commercially demonstrated individually. For coal gasification, the project would use Shell technology, which has operated commercially using coal feedstock in the Netherlands since the 1990s. For liquefaction, the SASOL F-T technology would be used, which has operated commercially in South Africa since the 1980s. One of the objectives of the proposed project would be to demonstrate the economic viability of the integrated technologies. To reduce costs, the project would take advantage of existing local infrastructure, including rail, water, and transmission lines. To accelerate deployment to potential customers, the integrated technologies would include systems that would be adapted easily to construction and operation by utilities and petroleum industries. Figure 2.1.3 displays a generalized diagram of the technologies integrated into the proposed facilities.

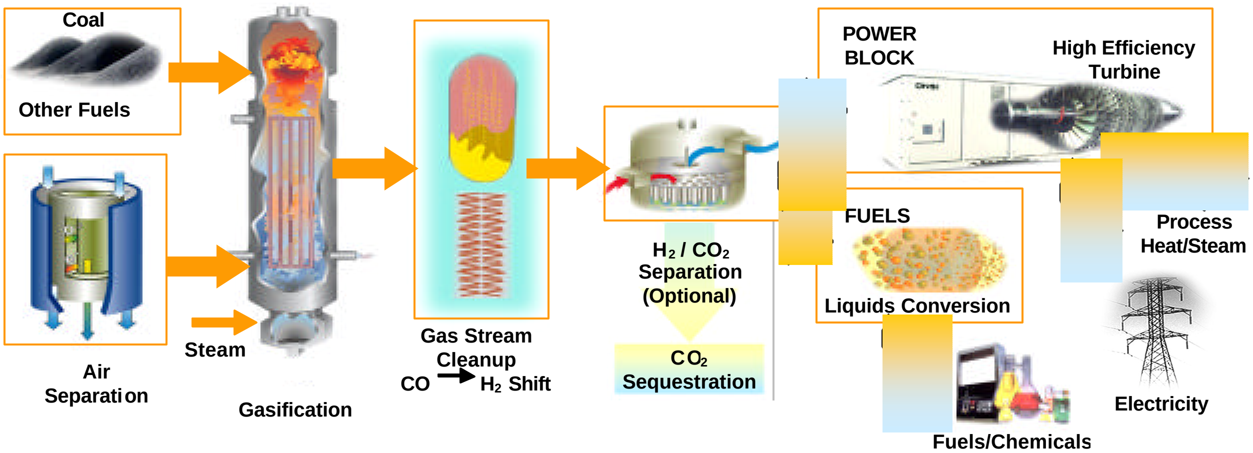


**Figure 2.1.3. A generalized diagram of the technologies integrated into the proposed facilities.**

The integration of these complex technologies offers potential economic and environmental advantages by allowing byproducts of some processes to be used as feedstock in other onsite processes. While the technology description includes the byproducts that are recycled into other processes, the environmental impacts of operations would result primarily from the energy and materials that enter and exit the overall system. To aid understanding of the proposed facilities and their environmental impacts, Figure 2.1.4 provides a simplified schematic that identifies inputs and outputs associated with major system components. Materials that would be recycled between the major system components are omitted.

### 2.1.2.1 Gasification Technology

The Shell gasification technology consists of the following six major processes (with subprocesses in parentheses): air separation, feedstock preparation (beneficiation, milling and drying), gasification and cooling (pressurization and feeding, gasification, high-temperature synthesis gas cooling, fine solids removal, scrubbing, sour water stripping), sour water-gas-shift and cooling, acid gas removal, and sulfur recovery and tail gas treating. The air separation unit would supply high-pressure oxygen (95% purity) to the gasifier and nitrogen (at least 99% purity) for culm feed pressurization and conveying and, if needed, for acid gas removal and other plant services.

To provide a consistent culm feed to the Shell gasification facilities, a new beneficiation plant or expansion of the existing facility in the adjacent valley to the north of the main plant area would be required to remove lower-quality material (e.g., rock) in the culm. The culm (sized as large as 3 ft upon arrival at the beneficiation plant) would be screened mechanically by bars that would tend to

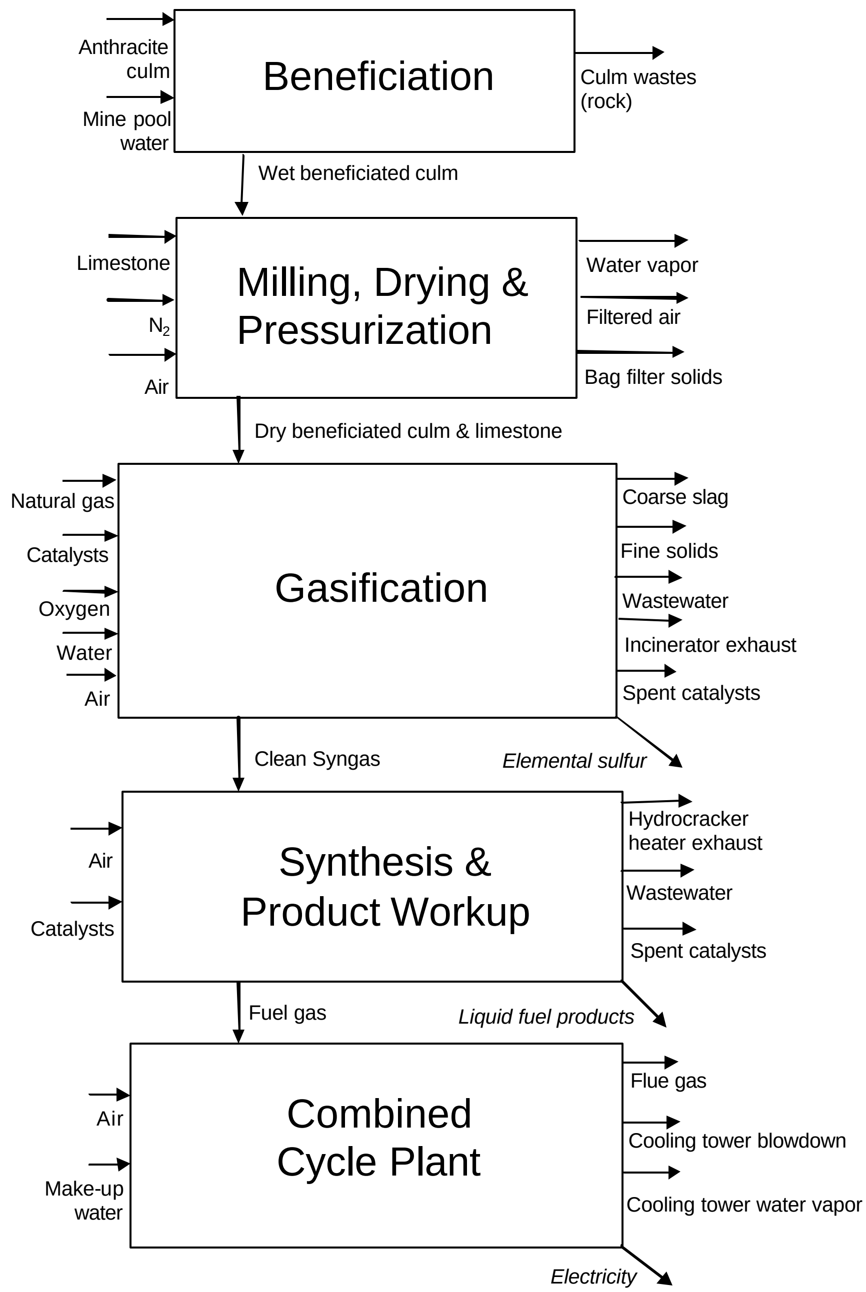


**Figure 2.1.4. Simplified schematic that identifies inputs and outputs associated with major system components of the proposed project.**

exclude the large, break-resistant rock, while allowing the higher-quality material to split and pass between the bars. As with the existing beneficiation plant, a flotation process would subsequently be used to separate the higher- and lower-quality material passing through the mechanical screening. The higher-quality material would be less dense and would tend to float, while the lower-quality material would be more dense and would tend to sink. The mechanically excluded rock and lower-quality material separated during flotation would be trucked from the beneficiation plant for reclamation of local coal stripping pits.

After flotation, the higher-quality anthracite culm from the beneficiation plant (sized no greater than 1 in.) would be transported by conveyor belts to the Shell gasification facilities. The culm would be ground and dried to a size suitable for efficient gasification (i.e., no greater than 50 μm). Micronized limestone would be injected into the culm stream in the milling and drying unit from a silo located in the main plant area. A bag filter would limit airborne particles from milling and drying. Milled and dried culm and limestone would be transported to the culm pressurization and feeding system by transport screws and rotary feeders. Pressurized culm and limestone would be withdrawn from feed vessels and pneumatically conveyed with nitrogen to the gasifier's burners. The pressurized feedstock and oxygen would enter the gasifier through pairs of opposed burners.

The gasifier would consist of a vessel operating at high temperature (i.e., above 2,700°F) and high pressure (i.e., about 700 lb per square inch) with a water-cooled internal wall chamber. An opening at the bottom of the gasifier would remove slag, and an opening at the top would allow hot synthesis gas and fine solids to exit. Most of the mineral content in the feed would leave the gasifier in the form of molten slag. The high gasifier temperature and limestone would ensure that molten slag flows freely down the reactor wall into a water-filled compartment at the bottom of the gasifier, where the molten slag would be quenched, solidified, and removed. Negligible non-methane hydrocarbons would be present in the synthesis gas because of the high temperature and high carbon conversion (greater than 99%) associated with the Shell gasification technology.

The hot raw synthesis gas leaving the gasification zone would be quenched with cooled, recycled synthesis gas from the synthesis gas cooler to convert any entrained molten slag into a hardened solid material prior to entering the synthesis gas cooler. Heat released during the cooling of the synthesis gas would be recovered by generating steam from water. The fine solids contained in the synthesis gas leaving the cooler would be removed using commercially available filters and sent to a silo for temporary storage prior to final disposal. Synthesis gas leaving the fine solids removal section would be cleaned and cooled further by a wet venturi scrubbing unit, which would remove any residual fine solids to a level of less than 1 ppm and would also remove minor contaminants such as soluble alkali salts and hydrogen halides. Make-up water would be added continuously to the wet scrubbing unit to compensate for evaporative losses and to generate a blowdown stream to control the concentration of contaminants. The contaminated water would be sent to a sour water stripping plant to remove hydrogen sulfide ($H_2S$), ammonia, and other soluble gases prior to a portion of the water being used as make-up for slag quenching. In the stripping plant, low-pressure steam would provide the necessary heat and stripping medium. Residual solids would be removed and recycled to the culm milling and drying unit. The remaining wastewater from the stripping plant would be combined with other effluents from the facilities and delivered to a new onsite wastewater treatment facility dedicated to the proposed facilities.

The raw synthesis gas leaving the stripping plant would be sent to the sour water-gas-shift facility where the hydrogen-to-carbon monoxide ($H_2$-to-CO) equilibrium ratio would be shifted. Specifically, a chemical reaction would occur in which a fraction of the CO would be oxidized to form carbon dioxide ($CO_2$), while steam ($H_2O$) would be reduced to produce $H_2$ to increase the $H_2$-to-CO ratio for optimum F-T synthesis. Prior to F-T synthesis, $H_2S$ would be removed from the shifted synthesis gas in the acid gas removal plant using a Rectisol unit and would be converted to marketable elemental sulfur in a Claus sulfur recovery unit. The Rectisol unit would also recover $CO_2$ (although not all of the $CO_2$ produced by the integrated technologies), which would be sold (e.g., purchased by specialty gas companies) or could be sequestrated in the future (although no firm plans currently exist). The off-gas stream exiting the Rectisol unit would be sent to a thermal oxidizer to destroy any trace organic contaminants prior to being released through a stack to the atmosphere.

The gasification facilities would process daily about 4,700 tons (dry) of anthracite culm and 430 tons of limestone to generate about 220 million standard $ft^3$ of synthesis gas consisting primarily of $H_2$ and CO gases. The facilities would also produce daily about 800 tons of coarse slag and 200 tons of fine solids on a dry basis. The Shell gasification technology has the flexibility to gasify anthracite culm with an ash content of up to 40%.

#### 2.1.2.2 Fischer-Tropsch Technology

The F-T technology consists of the following three major processes: F-T synthesis, product work-up, and effluent water primary treatment. The F-T synthesis plant would consist of a catalyst reduction unit and an F-T synthesis unit. To maintain a constant level of F-T catalyst, the catalyst reduction unit would activate fresh catalyst for use in the F-T slurry reactor to compensate for deactivated catalyst. Pure $H_2$ and synthesis gas would be required for the catalyst reduction and conditioning operation. The F-T synthesis unit would consist of the F-T slurry reactor and primary product recovery facilities. The synthesis unit would convert the shifted, clean synthesis gas containing $H_2$ and CO into hydrocarbon products, including wax and hydrocarbon condensate, reaction water, and tail gas (unreacted synthesis gas and light hydrocarbons from F-T synthesis). A portion of the tail gas would be recycled to increase the overall F-T synthesis conversion, while the remainder would be sent to a high-pressure fuel gas system for routing to the combined-cycle power plant.

In the product work-up section, the F-T wax and hydrocarbon condensate streams would be converted into the final products (i.e., diesel fuel and naphtha). The operation would also produce additional light hydrocarbon materials, which would be consumed as fuel within the plant.

The reaction water would be sent to the effluent water primary treatment unit (i.e., a fractionation column). The reaction water would contain a small quantity of oxygenates, including alcohols, ketones, aldehydes, and carboxylic acids, which are byproducts of the synthesis reaction. The effluent water primary treatment unit would remove the non-acid oxygenates prior to treatment of the effluent water at the wastewater treatment facility. Oxygenates would be recycled to the gasification facilities where their energy content would be recovered.

The F-T synthesis facilities would process the 220 million standard $ft^3$ of synthesis gas to produce approximately 5,000 barrels of F-T liquids per day, of which 3,700 barrels would be diesel fuel and 1,300 barrels would be naphtha. While the proposed plant would be designed to maximize diesel production with naphtha as a byproduct, the plant would have the flexibility to produce different mixes of products.

#### 2.1.2.3 Combined-Cycle Power Plant

The combined-cycle power plant would use all excess fuel gas from the facilities to generate electricity using a gas turbine and steam turbines. Steam would be injected into the gas turbine combustor to control oxides of nitrogen ($NO_x$) emissions by reducing the combustion temperature. Exhaust flue gas from the gas turbine would be conveyed to a heat recovery steam generator (HRSG) to generate steam for producing additional electricity in steam turbines. The total amount of electricity generated would be approximately 133 MW, of which 92 MW would be consumed internally by the proposed facilities and 41 MW would be exported to the regional power grid. Ammonia would be injected into the cooled flue gas to reduce $NO_x$ and CO in a selective catalytic reduction reactor. A stack would then discharge the flue gas to the atmosphere.

### 2.1.3 Construction Plans

Construction of the proposed facilities would begin in early 2006 and continue until mid 2008. Site preparation would include clearing of trees and other vegetation, site leveling and contouring, and construction of onsite roads, parking lots, fences, and stormwater drainage areas. Roads and parking lots would be constructed of asphalt or concrete on a crushed limestone base. Site preparation would also involve construction of load-bearing concrete piers and foundations for heavy and settlement-sensitive structures. Excavation would be performed for footings, grade beams, pits, basements, retaining walls, and catch basins. Topsoil removed during site preparation would be stored in stockpiles and later spread on finished contoured areas. Following site preparation, other phases of construction would include mechanical installation, piping interconnection, electrical installation, and instruments and controls configuration.

Construction materials would consist primarily of structural steel beams and steel piping, tanks, and valves. Locally obtained materials would include crushed stone, sand, and lumber for the proposed facilities and temporary structures such as enclosures, forms, and scaffolding. Components of the facilities would also include concrete, ductwork, insulation, and electrical cable.

Most of the materials would be delivered to the site by truck. A truck loading and unloading area would be built at the main plant site. If economically feasible, shipping by rail would also be an option for heavier components. The closest rail siding is approximately 1 mile away near the borough of Gilberton. From the rail siding, the components would be trucked to the site. Special permits and advanced planning would be required.

Large, pre-fabricated equipment (e.g., gasifier, F-T reactor) would likely be transported by ship or barge to the USX facility at Fairless Hills, Pennsylvania, on the Delaware River about 90 miles southeast of the proposed site. At the facility, the load would be transferred to truck for transport to the site. The USX facility is experienced with handling heavy loads and would be a viable option as part of optimizing highway routes and obtaining permits.

An average of 516 construction workers would be at the site during the construction period; approximately 1,000 workers would be required during the peak construction period. An average of about 50 vehicles would be used for construction activities on the site.

Land requirements during construction and operation are discussed in Section 2.1.5.1.

### 2.1.4 Operational Plans

After mechanical checkout of the proposed facilities, demonstration (including performance testing and monitoring) would be conducted over a 3-year period from mid 2008 until mid 2011. The project would demonstrate high-capacity operation and reliability of the facilities. About 250 workers would be required during the demonstration, of which approximately 150 would be plant operators with the remaining employees a mix of craft workers, managers, supervisors, engineers, and clerical workers. An average of about 50 vehicles would be used for operational activities on the site.

The truck loading and unloading area would be capable of handling all liquid fuels and byproducts generated by the proposed facilities, as well as required materials such as catalysts and chemicals. However, the liquid fuels are planned to be shipped from the facilities solely by rail.

If the demonstration is successful, commercial operation would follow immediately (Section 5). About 150 workers would be required for long-term operations. The facilities would be designed for a lifetime of 26 years, including the 3-year demonstration period.

### 2.1.5 Resource Requirements

Table 2.1.1 summarizes the operating characteristics, including resource requirements, for the proposed facilities.

#### 2.1.5.1 Land Area Requirements

Figure 2.1.5 displays a preliminary layout of the proposed main plant. About 9.5 acres of land would be required during construction for equipment/material laydown, storage, assembly of site-fabricated components, staging of material, and facilities to be used by the construction workforce (i.e., offices and sanitary facilities). The land for these temporary facilities would be situated adjacent to the truck loading area within the southeast quadrant of the 75-acre main plant site, which is currently an undisturbed forested area that would be cleared and graded.

**Table 2.1.1. Anticipated operating characteristics of the proposed facilities**

| Operating characteristics | Expected quantities | Operating characteristics | Expected quantities |
|---|---|---|---|
| Size of main plant site | 75 acres | Capacity factor [a] | 85% |
| **Production capacities** | | **Effluents** | |
| *Liquid fuels* | | *Air pollutants* [b] | |
| Diesel fuel | 3,700 barrels/day | Sulfur dioxide ($SO_2$) | 29 tons/year |
| Naphtha | 1,300 barrels/day | Oxides of nitrogen ($NO_x$) | 70 tons/year |
| *Electricity* | | Particulate matter (PM) | 23 tons/year |
| Consumed internally | 92 MW | Carbon monoxide (CO) | 54 tons/year |
| Exported | 41 MW | Volatile organic compounds (VOCs) | 28 tons/year |
| | | Hazardous air pollutants | <10 tons/year (individual) <25 tons/year (combined) |
| *Byproducts* | | | |
| Surplus steam | 0 lb/hour [c] | Ammonia | <100 tons/year |
| Elemental sulfur | 4,000 tons/year | Sulfuric acid mist | <15 tons/year |
| **Resource consumption** | | Carbon dioxide ($CO_2$) | 832,000 tons/year |
| Anthracite culm | 1,468,000 tons/year [c] | *Wastewaters* | |
| Petroleum coke | 0 tons/year [c] | Cooling tower blowdown | 877 gpm |
| Limestone | 134,000 tons/year | Process streams | 447 gpm |
| Methanol | 11,400 gal/year | Effluents from intake water treatment | 500 gpm |
| Sulfuric acid | 5,000 gal/year | Sanitary wastewater | 4 gpm |
| Ammonia | 3,200 gal/year | Boiler blowdown | 43 gpm |
| Natural gas | 17,000,000 BTU/hour | Stormwater runoff | 151 gpm |
| Cooling tower make-up water | 2,744 gpm | *Solid wastes* | |
| Process water at main plant | 1,028 gpm | Coarse slag | 250,000 tons/year |
| Process water at beneficiation plant | 386 gpm | Fine solids | 62,500 tons/year |
| Potable water | 4 gpm | Iron sludge | 3,400 tons/year |
| | | Wastewater treatment sludge | 4,000 tons/year |
| | | Spent iron-based catalysts | 50 tons/year |

[a] Capacity factor is the percentage of energy output during a period of time compared to the energy that would have been produced if the equipment operated at its maximum power throughout the period.

[b] Potential-to-emit annual emissions included in the air permit application submitted to the Pennsylvania Department of Environmental Protection were slightly greater because those emissions included other sources such as fugitive dust from facility vehicles traveling on roads. Specifically, those annual emissions were listed as 34 tons of $SO_2$, 72 tons of $NO_x$, 49 tons of PM, 64 tons of CO, and 33 tons of VOCs.

[c] Based on the most likely operational scenario, including using anthracite culm alone for the entire year.

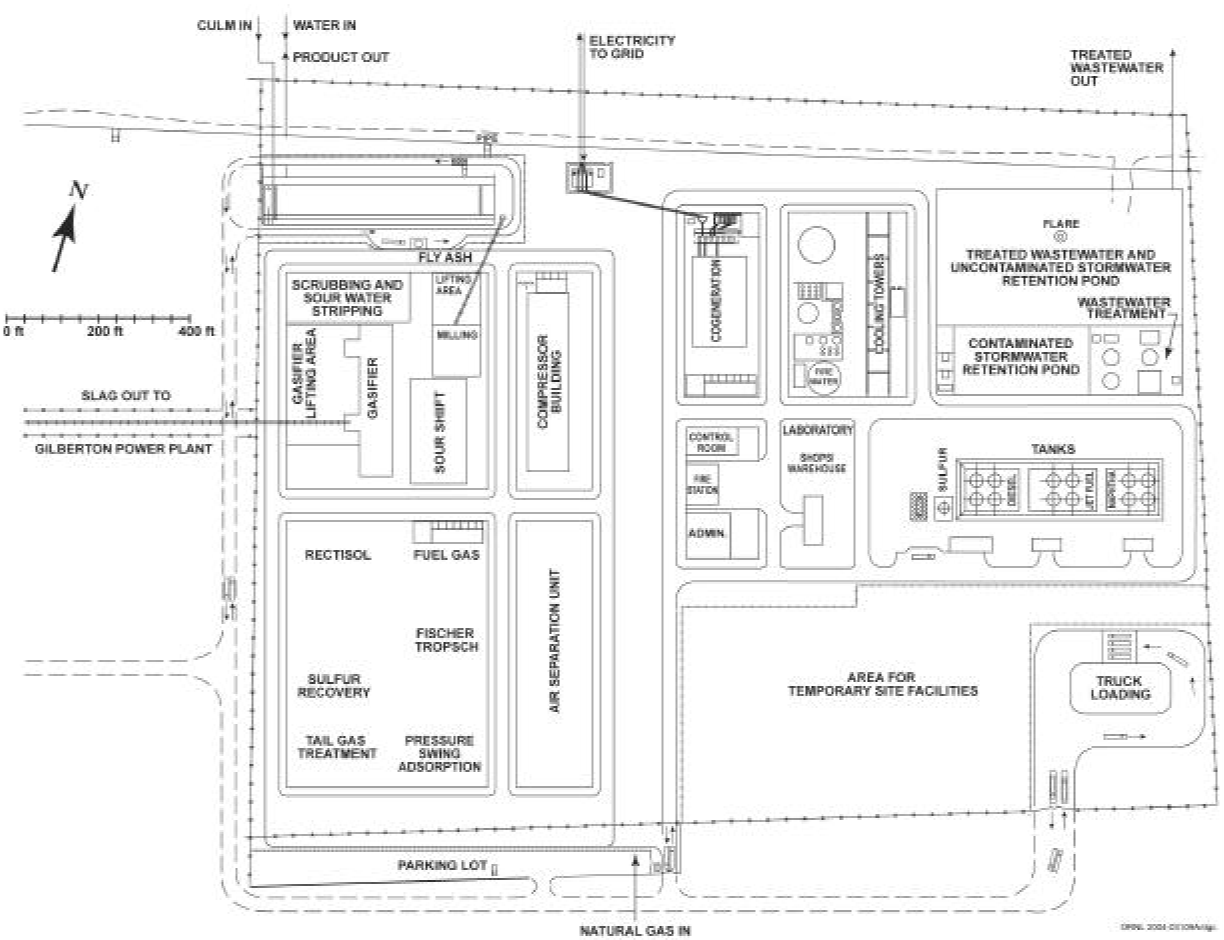


**Figure 2.1.5. Preliminary layout of proposed main plant.**

The new beneficiation plant or expansion of the existing facility in the adjacent valley to the north of the main plant area would probably require about 1 acre of land. In addition, slightly over 1 acre would be cleared from the main plant site to the beneficiation plant and railroad siding to establish a 5,000-ft long, 12-ft wide corridor. The corridor would accommodate (1) a new water supply pipeline transporting mine pool water from the existing pump house, (2) two new product pipelines transporting naphtha and diesel fuel to holding tanks in the railroad car loading area, and (3) possibly a new culm feed conveyor, which would traverse adjacent to the existing conveyor. All of these proposed items would be installed above ground. Similarly, about 0.5 acres would be cleared for a 2,000-ft by 12-ft path along which a new, aboveground wastewater line would run by gravity flow from the main plant site to an existing tailings pond to the north. About 0.4 acres would be cleared for a 1,500-ft by 12-ft corridor in which a new, buried natural gas line would run to the main plant site from the existing connection to the south. A minimal amount of land would be required for a new, 300-ft above-ground line to tap into the existing Hauto-Frackville #3 69kV transmission line immediately to the north of the main plant site. During operation, the land used previously for construction staging and lay down at the main plant site would be used for parking and other purposes.

### 2.1.5.2 Water Requirements

Water would be used during construction of the proposed facilities for various purposes including personal consumption and sanitation, concrete formulation, preparation of other mixtures needed to construct the facilities, equipment wash down, general cleaning, dust suppression, and fire protection. Water would be obtained from the Gilberton mine pool (a man-made aquifer resulting from a network of voids produced during underground mining activities) (Section 3.4.3). The water would be purified to a potable quality using demineralization and reverse osmosis at the main plant site as part of the plant process water system. Potable water use during construction would average about 1 gpm. Portable toilets would minimize requirements for additional sanitary water.

During operation, all water for process and potable needs would be drawn from the Gilberton mine pool. About 386 gpm of mine pool water would be used in the flotation process by the new beneficiation plant or upgraded existing facility and then transported by pipeline to an existing tailings pond (Figure 2.1.2) for percolation back to the mine pool. About 1,032 gpm would be withdrawn for process and potable water needs at the main plant site and would be purified to a potable quality using demineralization and reverse osmosis at the main plant site. Table 2.1.2 itemizes the process water requirements for the proposed facilities. Process water consumed at the main plant site would total about 534 gpm, primarily from (1) moisture loss in the wet slag and fines byproducts, (2) reaction losses to produce hydrogen in the gasification facilities, and (3) reaction losses to produce additional hydrogen in the sour water-gas-shift facility. Most of the remaining used process water would be treated in the wastewater treatment plant, conveyed to a synthetic-lined retention pond, and transported by a gravity-flow pipeline to the tailings pond. Potable water needs during operation would be about 4 gpm.

A closed-loop cooling water system would be installed to meet the cooling requirements of the gasification facilities, F-T synthesis facilities, and the combined-cycle power plant. The cooling system would feature a bank of 12 mechanical-draft cooling towers with 6 operating circulation pumps plus a spare to deliver a total circulation rate of 120,000 gpm. About 2,744 gpm of make-up water would be drawn from the mine pool to compensate for evaporation and blowdown from the cooling towers. Because the mine pool water is acidic with a high level of iron, aeration and pH adjustment would be required to remove the iron and improve the water quality to an acceptable level for use in the cooling towers. About 70% of the water loss would occur from evaporation, while nearly all of the remaining amount would be blowdown discharged from the cooling towers to the wastewater treatment plant for the purpose of controlling the level of total dissolved solids in the cooling water. About 1 gpm of water droplets would escape beyond the cooling towers' drift water eliminators to the atmosphere. Chemicals for biocide and corrosion inhibition would be injected into the circulating and make-up water.

**Table 2.1.2. Water balance for the proposed facilities**

| Plant and processes | | Cooling tower | | Total rate (gpm) |
|---|---|---|---|---|
| Source or fate | Rate (gpm) | Source or fate | Rate (gpm) | |
| **Water supplied (from mine pool)** | | | | |
| Pumped for process supply | 1,032 | Pumped for cooling tower supply | 2,744 | |
| Supplied to coal beneficiation plant | 386 | | | |
| Total | 1,418 | | 2,744 | 4,162 |
| **Consumption and losses** | | | | |
| Boiler feedwater deaerator vent | 1 | Evaporation and drift loss | 1,757 | |
| Gas turbine steam injection | 161 | | | |
| Net process consumption and losses | 372 | | | |
| Subtotal | 534 | | 1,757 | 2,291 |
| **Effluent discharged to tailings pond** | | | | |
| Mine pool water treatment purges | 381 | Water treatment purge | 110 | |
| Demineralizer regeneration wastes | 9 | Cooling tower blowdown | 877 | |
| Stripped sour water | 28 | | | |
| F-T wastewater | 124 | | | |
| Rectisol purge water | 36 | | | |
| Gasifier water purge | 106 | | | |
| Polisher regeneration wastewater | 6 | | | |
| Recovery condensate purge | 109 | | | |
| Boiler blowdown | 43 | | | |
| In-plant wash water and floor water | 38 | | | |
| Subtotal | 880 | | 987 | 1,867 |
| **Effluent discharged to septic system** | | | | |
| Domestic sewage | 4 | | | 4 |
| Total consumption, losses, and wastewater | 1,418 | | 2,744 | 4,162 |

### 2.1.5.3 Fuel and Other Material Requirements

The primary feedstock for the proposed facilities would be anthracite culm, which is abundantly available locally (about 100 million tons). Much of the culm is stacked in piles that were set aside during previous mining of anthracite coal because the quality of the culm was insufficient to sell it at the time. All of the culm would be suitable feedstock for the proposed facilities. The heating value of the culm averages about 5,500 Btu/lb prior to beneficiation and 8,340 Btu/lb after beneficiation, as compared to an average of about 11,000 Btu/lb for freshly mined anthracite coal. The gasification facilities would process daily about 4,700 tons (dry) of anthracite culm with 430 tons of limestone used as a flux, which would be added to the feedstock in the culm milling and drying unit to lower the ash melting temperature of the culm and promote fluidity. The proposed facilities would also be capable of using a blend of feedstock containing up to 25% petroleum coke (Section 2.1.2). Table 2.1.3 presents analyses of the composition of beneficiated anthracite culm and petroleum coke.

**Table 2.1.3. Analysis of the composition of anthracite culm and petroleum coke expected to be received at the proposed facilities**

| Characteristic | Beneficiated anthracite culm | Petroleum coke | |
|---|---|---|---|
| | | Sample 1 | Sample 2 |
| Heating value, Btu/lb (dry basis) | 8,340 | 14,191 | 15,251 |
| Analysis, percent by weight [a] | | | |
| Moisture | 1.9 | 11.7 | 0.4 |
| Carbon | 54.4 | 88.6 | 85.9 |
| Hydrogen | 1.7 | 1.8 | 3.9 |
| Nitrogen | 0.7 | 1.7 | 1.3 |
| Sulfur | 0.3 | 6.2 | 5.4 |
| Ash | 40.0 | 0.7 | 1.8 |
| Oxygen | 2.9 | 1.0 | 1.7 |
| Chlorine | -- | -- | -- |

[a] Because the analysis was conducted on a dry basis for all constituents except moisture, the sum of percentages for all constituents excluding moisture equals 100% in each column.

*Source:* WMPI PTY, LLC

The culm would be trucked from the surrounding local area to the beneficiation plant. The limestone would be trucked in micronized form (i.e., the milling would be conducted at the limestone quarry) from mines within 100 miles of the project site, probably from a quarry at Herndon, Pennsylvania, located about 35 miles west of the site. If used by the proposed facilities during commercial operation following the demonstration period, petroleum coke would be delivered by truck or rail from undetermined locations outside of the local area. The culm, limestone, and petroleum coke would be unloaded at the beneficiation plant, truck unloading area, or railroad car unloading area, as appropriate.

About 11,400 gal of methanol would be used annually as a solvent for the Rectisol process. About 5,000 gal per year of sulfuric acid would be used for processing and wastewater treatment. About 3,200 gal per year of ammonia would be used for selective catalytic reduction in the combined-cycle power plant to reduce $NO_x$ and CO in the flue gas. These chemicals would be trucked to the truck unloading area.

A new, buried line would deliver natural gas to the main plant site from the existing connection about 1,500 ft to the south. The natural gas would be used as fuel to incinerate (1) tail gas from the Rectisol unit in a thermal oxidizer and (2) vented fumes from the truck loading and unloading area in a thermal incinerator.

### 2.1.6 Outputs, Discharges, and Wastes

Table 2.1.1 includes a summary of discharges and wastes for the proposed facilities.

#### 2.1.6.1 Air Emissions

Based on a plant operating rate of 7,500 hours per year (an 85% capacity factor), air emissions from the proposed facilities would total less than 100 tons per year for each of the criteria pollutants. $SO_2$ emissions would be about 29 tons per year, $NO_x$ emissions would be about 70 tons per year, particulate emissions would be about 23 tons per year, and CO emissions would be about 54 tons per year. VOC emissions would be about 28 tons per year (see footnote b of Table 2.1.1 for potential-to-emit annual emissions included in the air permit application submitted to the Pennsylvania Department of Environmental Protection). Trace emissions of other pollutants would include mercury, beryllium, sulfuric acid mist, hydrochloric acid, hydrofluoric acid, benzene, arsenic, and various heavy metals, which are not yet quantified but for which an air quality permit has been issued by the Pennsylvania Department of Environmental Protection with annual limits to ensure that the proposed facilities would be a minor new source of the pollutants (Section 4.1.2.2). The proposed facilities would also emit about 832,000 tons per year of $CO_2$. Although $CO_2$ is not considered an air pollutant, it contributes to the greenhouse effect that is suspected to cause global warming and climate change (Mitchell 1989).

Air emissions would be vented continuously from five 200-ft stacks and flared infrequently from a 300-ft emergency stack. The 200-ft stacks would be associated with the HRSG, F-T product work-up area (2 stacks), thermal oxidizer, and tank truck loading area. The emergency stack would flare quenched, raw synthesis gas from the gasifier during start-ups and during unexpected shut-downs such as during loss of power or loss of cooling water.

#### 2.1.6.2 Liquid Discharges

Most of the water processed through the proposed facilities would be classified as wastewater that would require treatment at the new onsite wastewater treatment facility prior to discharge to a tailings pond and seepage back to the mine pool. No wastewater would be discharged to surface waters. The wastewater treatment plant, which would be located in the northeastern corner of the main plant area (Figure 2.1.5) and dedicated to the proposed facilities, would receive all waste streams from the process areas and rainfall runoff considered contaminated. The plant would remove oil, sludge, and other organic compounds from the water using an oil/water separator, air flotation unit, and biological reactor, and would neutralize the water to a pH of 7. Oil recovered by the oil/water separator would be directed to a used oil storage tank and ultimately removed by a contractor for recycling and/or disposal. About 447 gpm of liquid effluent from process sources, including F-T wastewater, gasifier purge water, and Rectisol (acid gas removal) purge water, would require treatment. About 500 gpm of effluent from initial treatment of mine pool water, 877 gpm of cooling tower blowdown, and 43 gpm of other blowdown water would receive less extensive treatment before discharge to the tailings pond.

Rainfall runoff from the uncovered process plant areas (areas without roofs) would be considered contaminated and would drain via a segregated collection system of buried pipes and open ditches to a synthetic-lined stormwater retention pond prior to treatment. The retention pond would be sized at a 2,000,000-gal capacity to accommodate flow from a 100-year storm (6 in. of rainfall during a 24-hour period). The wastewater treatment facility would be sized to process contaminated rainfall runoff, in addition to the continuous waste streams associated with operation of the facilities. After treatment, the wastewater would be conveyed to a larger synthetic-lined retention pond sized at a 15,000,000-gal capacity.

Rainfall runoff from uncontaminated process plant areas (areas with roofs) and non-process plant areas (e.g., parking lots and outdoor storage areas) would be classified as uncontaminated and would drain by another set of buried pipes and open ditches directly to the larger retention pond. Some process plant areas would contain retention dikes with two independent valves to allow plant maintenance personnel to determine whether the stormwater should be directed to the wastewater treatment plant or could bypass the treatment plant. In the larger retention pond, uncontaminated rainfall runoff would combine with uncontaminated process water and treated wastewater. The blended streams would subsequently be transported by a gravity-flow pipeline to the existing tailings pond for percolation back to the mine pool, with the rate of discharge to the tailings pond being controlled by the retention pond. Suspended solids included in the effluent would be trapped within the tailings pond and would not percolate to the mine pool.

Either a new septic system or an addition to the existing septic system for the Gilberton Power Plant would be constructed for management of sanitary wastewater and sewage. The septic system would be designed for continuous operation at a capacity of 4 gpm.

### 2.1.6.3 Solid Wastes

#### Construction

During construction of the proposed facilities, land preparation activities would include clearing, grubbing, stripping, excavation, and placement of fill to establish approximate grading elevations. All trees, stumps, roots, vegetation, rubbish, and other unsuitable material would be removed to a depth of 3 ft below the existing grade or below the final grade, whichever would be greater. Reusable topsoil and soil containing organic material would be stored in stockpiles and later overlaid on finished grading areas.

Potential construction waste could include metal scraps, electrical wiring and cable, surplus consumable materials (e.g., paints, greases, lubricants, and cleaning compounds), packaging materials, and office waste. However, much of these materials would be retained in the operating stores warehouse for future use, and the recyclable paper would periodically be collected and transferred to environmental waste recycling facilities. Metal scraps unsuitable for the operating stores warehouse would be sold to scrap dealers, while the other remaining materials would be collected in a dumpster and periodically trucked off the site by a waste management contractor for disposal in a licensed landfill. The volume of metal scrap would be no more than one dumpster per month during the period of peak scrap generation, with less generated during the first six months and last three months of construction.

Packaging materials and nonmetal components broken during installation would be collected in dumpsters for offsite disposal. The largest volume of solid waste requiring disposal would be packaging material, including wooden pallets and crates, support cradles used for shipping of large vessels and heavy components, and cardboard and plastic packaging. The rate of generation for packaging waste would be up to two truckloads per month (about 18 $yd^3$ or 18 tons per month) during construction. The volume of broken components would be much smaller.

No hazardous waste generation is anticipated during construction. If any hazardous waste, as defined under the Resource Conservation and Recovery Act (RCRA), is generated incidental to project construction, quantities would be small. Such waste would be handled in accordance with standard procedures currently employed at the Gilberton Power Plant.

### Operation

During operation, the proposed facilities would consume anthracite culm as feedstock from operating mines and/or from land currently stockpiled with culm covering about 1,000 acres in Schuylkill County (where the facilities would be located) and the adjacent Northumberland County to the northwest. Based on an 85% capacity factor, coal gasification byproducts would include about 250,000 tons per year of coarse slag and 62,500 tons per year of fine solids (dry basis). These wastes would generally be managed wet, which would approximately double the weight of the waste material. The anticipated characteristics of the coarse slag and fine solids are displayed in Table 2.1.4.

**Table 2.1.4. Expected characteristics of coarse slag and fine solids generated by the proposed facilities**

| | Coarse slag | Fine solids |
|---|---|---|
| Ash, wt% | 48.2 | 44.5 |
| Carbon, wt% | 1.8 | 5.5 |
| Water, wt% | 50.0 | 50.0 |
| Particle diameter (nominal), inch | 0.25 | 0.002 |
| Bulk density, dry, $lb/ft^3$ | 38.6 | NA[a] |
| Bulk density, wet, $lb/ft^3$ | 76.9 | NA |

[a]Not available
*Source*: WMPI PTY, LLC

During gasification, molten slag would flow freely down the reactor wall into a water-filled compartment at the bottom of the gasifier vessel, where the molten slag would be quenched, solidified, and removed. The slag would be crushed and discharged as a wet mixture. Coarse slag would be sold as a marketable byproduct to the extent possible. If the slag were sold, the moisture would be drained prior to shipment of the slag by truck or rail (the slag could be transported by conveyors to the vicinity of the railroad siding about 1 mile away near the borough of Gilberton). If no markets were found, the slag would probably be used for restoration of sites where culm was removed or in other local mine reclamation. The fine solids would be trucked to the adjacent valley to the northeast for placement in a permitted ash disposal area on WMPI land. The ash disposal area is permitted for disposal of coal byproducts as part of mine reclamation. Disposal would move to other previously mined areas as needed to accommodate the fine solids.

About 3,400 tons per year of iron sludge extracted during the purification of water from the mine pool and about 4,000 tons per year of dewatered wastewater treatment plant sludge would be trucked to the adjacent valley to the northeast for placement in the permitted ash disposal area on WMPI land. As with the fine solids, disposal would move to other previously mined areas as needed.

Approximately 4,000 tons per year of elemental sulfur would be produced in a Claus sulfur recovery unit as a result of $H_2S$ removal from the shifted synthesis gas. The sulfur would be trucked off the site to be sold as a byproduct.

In addition to process wastes, solid wastes generated during facility operation would include used office materials and packaging materials. The disposition of these items would be similar to that discussed previously for these materials during the construction period.

#### 2.1.6.4 Toxic and Hazardous Materials

Operation of the proposed facilities would involve potentially toxic or hazardous materials and wastes generated during operation, including waste paints, solvents, oils, and empty material containers. Hazardous wastes generated during operation would be removed from the site by a waste management contractor at regular intervals and trucked to authorized facilities for disposal. Wastes would also include about 50 tons per year of spent iron-based catalysts from the F-T synthesis technology, which would be replaced periodically and returned by truck to the manufacturer for regeneration.

The facilities would implement a program to reduce, reuse, and recycle materials to the extent practicable. All light bulbs would be treated as hazardous waste and transported to properly licensed facilities for disposal. The facilities would have a Spill Prevention, Control, and Countermeasures Plan (SPCCP) (40 CFR Part 112) addressing the accidental release of materials to the environment.

## 2.2 ALTERNATIVES

The goals of a federal action establish the limits of reasonable alternatives under the NEPA process. Congress established the CCPI Program with a specific goal— to accelerate commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States. DOE's purpose in considering the proposed action (to provide cost-shared funding) is to meet the goal of the program by demonstrating the viability of the proposed project (the integration of coal gasification and F-T synthesis technologies to produce electricity, steam, and liquid fuels). Reasonable alternatives to the proposed action must be capable of meeting this purpose [however, CEQ NEPA regulation 40 CFR Part 1502.14(d) requires the alternatives analysis in the EIS to include the no-action alternative].

Congress directed DOE to pursue the goals of the legislation by providing partial funding for projects owned and controlled by non-federal-government participants. This statutory requirement places DOE in a much more limited role than if the federal government were the owner and operator of the project. In the latter situation, DOE would typically review a wide variety of reasonable alternatives to the proposed action. However, in dealing with a non-federal applicant, the scope of alternatives is necessarily more restricted, and DOE gives substantial weight to the needs of the proposer in establishing reasonable alternatives to the proposed action. Moreover, under the CCPI Program, DOE's role is limited to approving or disapproving the project as proposed by the participant.

Thus, the only alternative to the proposed action that has not been dismissed from further consideration is the no-action alternative (Section 2.2.1).

### 2.2.1 No-Action Alternative

Under the no-action alternative, DOE would not provide cost-shared funding to demonstrate the commercial-scale integration of coal gasification and F-T synthesis technologies to produce electricity, steam, and liquid fuels. Without DOE participation, the proposed project would be canceled due to insufficient funding and may not be demonstrated elsewhere. Consequently, eventual commercialization of the integrated technologies would probably not occur because utilities and industries tend to use known and demonstrated technologies rather than unproven technologies.

At the site of the proposed project, it is reasonably foreseeable that no new activity would occur. WMPI would not construct and operate the proposed facilities. Accordingly, no employment would be provided for construction workers in the area or facility operators. No electricity, steam, or liquid fuels would be produced by the proposed facilities. No resources would be required and no discharges or wastes would occur. No anthracite culm would be removed from piles in the local area for use by the proposed facilities. No change in current environmental conditions at the site would result. The adjacent Gilberton Power Plant would continue to operate without change. This scenario would not contribute to the CCPI Program goal of accelerating commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States.

Table 2.2.1 presents a comparison of key potential impacts between the proposed facilities and the scenario under the no-action alternative.

**Table 2.2.1. Comparison of key potential impacts between the proposed facilities and the no-action alternative**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Land use and aesthetics | The locations of the proposed main plant and ancillary facilities would not affect offsite land use. Over the 26-year operating life of the proposed facilities, approximately 1,000 acres of land would be reclaimed after culm removal to provide feedstock for the facilities. Because the visual landscape is already conspicuously marked with industrial structures, the proposed facilities would not alter the industrial appearance of the site and would not degrade the aesthetic character of the area. | Offsite land use would not be affected. No additional structures would be built. Impacts would remain unchanged from existing conditions. |
| Air quality | Modeling results based on emissions from the proposed facilities predicted that maximum concentrations would be less than their corresponding significant impact levels. Concentrations would be negligible at the nearest Prevention of Significant Deterioration (PSD) Class I area (Brigantine Wilderness Area). The small percentage increases in VOC and $NO_x$ emissions would not be likely to degrade local or regional air quality sufficiently to cause violations in the $O_3$ standards, but the magnitude of the degradation cannot be quantified. Limits stated in the authorized permit would ensure that the proposed facilities would be a minor new source of hazardous air pollutants. Because nearly complete $H_2S$ removal from the shifted synthesis gas would be required by the downstream F-T synthesis process, odorous emissions of $H_2S$ should not be perceptible. Upon initial operation of the proposed facilities, conditions at Interstate 81 would be monitored and, if warranted, flashing lights would be installed to warn motorists of fog. Increases in $CO_2$ emissions from the proposed facilities would be large in terms of number of tons per year but small in comparison to global totals. | No additional air emissions would occur. Impacts would remain unchanged from existing conditions. |
| Geology | Because the proposed main plant would be built over rock units that do not contain coal, the plant would not be affected by subsidence from mining activities. Subsidence could, however, affect product transfer lines and related facilities in the valley of Mahanoy Creek. The possibility of abrupt subsidence has decreased over time following the closure of underground mines, and will continue to decrease in the future. The potential risks of product line leakage due to gradual subsidence would be reduced by inspecting product lines regularly and repairing any problems. | Impacts would remain unchanged from existing conditions. |

**Table 2.2.1. Continued**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Water resources | Impacts attributable to construction-related runoff would be minimal. Because the facilities would increase the area of impervious surface on Broad Mountain, water that previously would infiltrate the soil to enter the groundwater under Broad Mountain would instead be included in the wastewater discharge to Mahanoy Creek valley, thus reducing groundwater recharge to the aquifers on Broad Mountain. Estimated recharge within a 1,000-ft radius of the Morea well should remain sufficient to meet the needs of the Morea water system, and other wells farther away from the proposed facilities should not be affected. Operation of the proposed facilities would reduce the water volume in the Gilberton mine pool and the volume of water needed to be pumped from the mine pool and discharged to Mahanoy Creek in order to prevent flooding. These changes would result in reduced stream flow in the creek. However, the creek would not go dry from receiving less mine pool water because the creek's minimum flows would be maintained by continuous discharges from mine openings in upstream portions of the watershed. Discharge of treated effluent to the mine pool by seepage from the tailings pond would be expected to improve mine pool water quality by reducing concentrations of acidity and dissolved metals. Consequently, water pumped from the mine pool to Mahanoy Creek would also improve in quality. | No changes in water requirements or discharge of effluents would occur. Impacts would remain unchanged from existing conditions. |
| Floodplains and wetlands | The main plant and a new culm beneficiation plant or expansion of the existing facility would be located above the elevation of the 100-year floodplain. Ancillary facilities that would cross the 100-year floodplain of Mahanoy Creek would be placed atop an existing trestle at an elevation above the 100-year floodplain. No new construction within the floodplain would be required. Construction and operation of the proposed facilities would have no adverse effects on wetlands because none are present on the project site. | No floodplains or wetlands would be affected. Impacts would remain unchanged from existing conditions. |
| Ecological resources | Loss of approximately 76.5 acres of deciduous forest to construct the main plant and ancillary structures would affect wildlife species. Over the long term, the terrestrial habitat created on reclaimed lands from which culm would be obtained would offset the loss of deciduous forest. Impacts to aquatic habitats and fish from construction and operation of the proposed facilities would be minor to negligible because no surface waters are on or in the immediate vicinity of the proposed project site. Because the proposed facilities would not be located within an area that provides habitat for any protected species except for occasional transient individuals, it is unlikely that any such species would be affected by project construction or operations. | No clearing of trees or other vegetation would be required. Impacts would remain unchanged from existing conditions. |

**Table 2.2.1. Continued**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Socioeconomic resources | Construction and operation of the proposed facilities would not result in major impacts to population, housing, local government revenues, or public services in Schuylkill County. With regard to environmental justice, one nearby census tract has significant minority populations residing at the Mahanoy and Frackville State Correctional Institutions. Disproportionately high and adverse impacts to these populations would not be expected because (1) air quality impacts would not be appreciable with the exception of temporary fugitive dust during construction; and (2) the adjacent Mahanoy State Correctional Institution is a sealed facility in which inmates and employees would not be exposed to outside air except during periods of outdoor activity. Similarly, for two nearby census tracts that have relatively high poverty rates, disproportionately high and adverse impacts to these populations would not be expected. Increases in traffic during project construction would likely cause congestion and have an appreciable impact on traffic flow and safety during morning and afternoon commutes. WMPI personnel have committed to contacting the Pennsylvania Department of Transportation to discuss potential mitigation options, including signaling, road widening, and scheduling work hours and/or deliveries to avoid periods of heavy traffic. Although the impacts of additional operations-related traffic would be less severe than those during construction, they would be more long lasting. WMPI personnel have committed to contacting the Pennsylvania Department of Transportation to discuss the same potential mitigation options. Impacts on historic or archaeological properties would not be likely because the State Historic Preservation Office has identified no such properties in the project area. | No employment would be provided for construction workers in the area or for operators of the proposed facilities. Impacts would remain unchanged from existing conditions. |
| Waste management | Solid wastes and byproducts generated during operations would be sold, used for mine reclamation, or transported to an offsite commercial landfill for disposal. None of these materials would be expected to be hazardous as defined under the Resource Conservation and Recovery Act (RCRA). The Toxicity Characteristic Leaching Procedure test would be performed to verify this expectation, and any wastes found to be subject to RCRA hazardous waste regulations would be handled in accordance with applicable procedures. Wastewater from the gasification and liquefaction processes would be combined with stormwater from process areas in an equalization basin, then routed to a series of oil-water separation units where droplets of oil and grease would be recovered and oily sludge would be collected for disposal or recycling to the gasification process. Effluent from this stage of treatment would be mixed with non-oily wastewater streams and routed to a biological treatment unit that would combine aeration with clarification in order to treat wastewater with high levels of chemical and biological oxygen demand. This unit would be designed to consume the organic compounds and nutrients in the wastewater, yielding treated effluent for discharge and a biological sludge for disposal. Potential odor impacts from liquid waste streams would be controlled by treating all process wastewater within enclosed facilities prior to discharge to the final equalization basin. | No changes would result to the current management of solid and hazardous waste in the proposed project area. Impacts would remain unchanged from existing conditions. |

**Table 2.2.1. Concluded**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Human health and safety | Regarding operational air emissions, all maximum ambient concentrations of criteria pollutants from the proposed facilities were estimated to be less than their corresponding significant impact levels, and the air permit establishes maximum allowable limits to ensure that the proposed facilities would be a minor new source of hazardous air pollutants (e.g., mercury). The proposed facilities would be subject to Occupational Safety and Health Administration standards. During construction, permits would be required and safety inspections would be employed to maximize worker safety. Construction equipment would be required to meet all applicable safety design and inspection requirements, and personal protective equipment would be used, as needed to meet regulatory standards. Operations would be managed from a control room. All instruments and controls would be designed to ensure safe start-up, operation, and shut down. No perceptible changes in electromagnetic fields would occur because no new transmission line would be built. The probability of a catastrophic accident associated with the facilities, including transportation of liquid fuels off the site, would be very unlikely. | Impacts would remain unchanged from existing conditions. |
| Noise | During operations, the increase in noise levels (i.e., 3 dB) would probably be imperceptible at the Mahanoy State Correctional Institution because of (1) the distance between the prison and the proposed project site, (2) planned noise attenuation measures, (3) natural and man-made terrain features and structures, and (4) the limited period during which inmates are allowed outside the sealed prison. No perceptible change in noise associated with the proposed facilities would be expected at the nearest residence or other offsite locations. | No additional noise would be generated. Impacts would remain unchanged from existing conditions. |

## 2.2.2 Alternatives Dismissed from Further Consideration

The following sections discuss alternatives, including alternative sites and technologies, that were initially identified and considered by DOE or the project participant. The project as proposed meets the needs outlined in the CCPI solicitation that was issued by DOE in March 2002 (Section 1.2). Factors considered in DOE's project selection process included the desirability of projects that collectively represent a diversity of technologies, utilize a broad range of U.S. coals, and represent a broad geographical cross-section of the United States. Otherwise, DOE did not constrain the proposals with regard to site or technology.

The proposals included responses to a DOE environmental questionnaire (Section 1.5). The responses contained discussions of the site-specific environmental, health, safety, and socioeconomic issues associated with each project. Based on the evaluation criteria discussed in Section 1.2, including consideration of environmental implications, DOE selected 8 projects, including the proposed project, for possible cost-shared financial assistance.

Because DOE's role would be limited to providing (1) cost-shared funding for the selected project and (2) a possible loan guarantee, DOE is limited to either accepting or rejecting the project as proposed by the participant, including the proposed technology and site. As such, reasonable alternatives to the proposed project are narrowed and the following alternatives have been dismissed from further consideration.

#### 2.2.2.1 Alternative Sites

No other sites to host the proposed project were seriously considered by WMPI PTY, LLC and its project partners. The site needed to closely meet the project's technical needs and easily integrate with existing infrastructure (e.g., roads, railroad siding, electrical transmission lines). An existing plant site or site adjacent to an existing plant site would avoid the additional cost associated with construction of facilities and infrastructure at an undeveloped, remote site, and the environmental impacts likely would be much greater at a site without existing infrastructure. The geographical area considered for the proposed site was limited by the economic and environmental advantages resulting from using nearby piles of anthracite culm, the primary feedstock for the proposed facilities. Because WMPI's Gilberton Power Plant is adjacent, the site proposed for the facilities by the participant was an obvious choice. Based on the above considerations, other sites are not reasonably foreseeable alternatives and are not evaluated in this EIS.

#### 2.2.2.2 Alternative Technologies

Other technologies have been dismissed as not reasonable. The proposed project was selected to demonstrate the integration of coal gasification and F-T synthesis technologies to produce electricity, steam, and liquid fuels. Other CCPI projects were selected to demonstrate other coal-based technologies. The projects selected for demonstration are not considered alternatives to each other.

The use of other technologies and approaches that are not applicable to coal (e.g., natural gas, wind power, solar energy, and conservation) would not contribute to the CCPI Program goal of accelerating commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States.

#### 2.2.2.3 Other Alternatives

Other alternatives, such as delaying or reducing the size of the proposed project, have been dismissed as not reasonable. Delaying the project would not result in any change of environmental impacts once the project were implemented but would adversely delay reductions in waste disposal from operating mines, delay reclamation of land currently stockpiled with culm, and adversely affect the CCPI Program goal. The design size for the proposed project was selected because it is sufficiently large to show potential customers that the integrated technologies, once demonstrated at this scale, could be applied commercially without further scale-up. A demonstration indicating that the performance and cost targets are achievable at this scale would convince potential customers that the integration of these technologies is not only feasible but economically attractive (Section 1.4).